

Contradictions and strengths in activity systems: Enhancing insights into human activity in IS adoption research

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Abstract

Activity Theory is increasingly employed in Information Systems research because of its ability to provide insights into the outcomes of human-technology interaction. At the heart of the modern Activity Theory is the principle of contradictions; contradictions are considered to be the driving force behind the transformation of tool-mediated human activities within organizations and communities. The study examined the facilitated adoption of Accounting Information Systems by microenterprises in a low-income community in South Africa. Using the study, this paper demonstrates the potential and value of leveraging both strengths and contradictions in activity systems. Although identifying and resolving contradictions is crucial to the development of human activity, in the context of this research a limitation was identified. In studying relationships between the elements of an activity or between activities, researchers using Activity Theory do not generally highlight the strong relationships. The inclusion of strengths in the analysis of activity systems is a feature that could be utilised by Activity Theorists where there is a need to assess the viability of the activity under examination. Though the paper emphasises a theoretical contribution, the study itself had a practical contribution based on the use of Activity Theory as a Participatory Action Research to empower the subjects (entrepreneurs) within the community.

KEYWORDS

accounting information systems, activity theory, facilitated technology adoption, human activity systems, ICT for development

1 | INTRODUCTION

1.1 | Motivation for the paper

Low-income communities face social challenges, stemming in many cases from high unemployment and poor infrastructure. The conditions in these communities in South African are considered to be representative of marginalized communities elsewhere in Africa.

This paper primarily makes a theoretical contribution to Activity Theory and hence spends some time explaining aspects of Activity Theory. The full study from which the paper is derived not only addressed the theoretical perspective of the human activities, but incorporated the practical aspect of implementing and supporting the usage of AIS in the three township microenterprises that participated.¹ This case study is used to illustrate the claims made regarding the importance of highlighting strong relationships as well as contradictions. Activity Theory was especially useful in the example used because it provided a comprehensive theory for describing the inseparability of learning and doing (Barab, Barnett, Yamagata-Lynch, Squire, & Keating, 2002).

1.2 | Background

The diffusion of ICT (considered to be an organic process) within a low-income community is often slow and this disadvantages local micro-enterprises in the digital era. The facilitated approach to the adoption of AIS was intended to speed up the typically unaided process of diffusion. As both the researcher and the owner-managers actively participated in the study (Participatory Action Research), the likelihood for sustained adoption was increased.

The study refers to a well-established social theory, namely, the third generation of Activity Theory (Engeström, 1999). A participatory action research approach has been favoured by the forefathers of Activity Theory and the new generation of activity theorists (Sannino & Engeström, 2018). Activity Theory, through its principles (explained in the next section), can unearth rich and meaningful information during the interaction of humans with information technology (including information systems and ICT) in a cultural-historical context. A feature of Activity Theory used in this paper, is the principle of contradictions. The paper does, however, add a corollary to that principle as will be seen.

2 | LITERATURE REVIEW

2.1 | Activity Theory in multiple fields of research and in multidisciplinary research

One group of activity theorists emphasises the historical and cultural contributions to human activity, including the sociogenesis of knowledge (Cole 1998 cited by McMillan, 2009), while others, like Engeström, focus on how situational factors shape human actions (McMillan, 2009). The later approach assists in clarifying what comprises a social practice and identifies factors that constitute that practice (Billet 2002 cited by McMillan, 2009). However, these two approaches are not mutually exclusive.

Activity Theory has been widely applied in learning or educational studies, but more recently, areas of research have included transformation in communities and social movements and in more generally in social science, anthropology and work science (Sannino & Engeström, 2018). It is recognised as a multidisciplinary research approach, which is increasingly oriented towards the study of technological and human aspects within organizations and social systems (Barab, Evans, & Baek, 2004; Nardi, 1996; White & Cicmil, 2016).

Kaptelinin, Kuutti and Nardi are members of a group that pioneered the use of Activity Theory in Human Computer Interaction (HCI) research in the 1990s (Kaptelinin & Nardi, 1997; Kuutti, 1996; Nardi, 1996). Activity Theory is increasingly applied to research in Information Systems (IS) (Karanasios & Allen, 2018; Mursu, Luukkonen, Toivanen, & Korpela, 2007). IS researchers have started turning to Activity Theory as they acknowledge the importance of understanding the interactions between humans and technology in social and cultural contexts (Kaptelinin & Nardi, 2018).

The transformative and participatory nature of Activity Theory is highlighted by Sannino and Engeström (2018, p. 45) who say that *"the founders of what was to become Activity Theory were deeply involved in practical interventions aimed both at improving the lives of the research participants and at pushing forward the cultural-historical understanding of human functioning."*

2.2 | The ongoing development of Activity Theory

Engeström (1987) modified the Activity Theory model (illustrated in Figure 1) and drew from Ilyenkov's (1977) work which emphasised the importance of contradictions within activity systems as the driving force of change and thus development. This resulted in the version of Activity Theory that is frequently applied in IS research (Dayton, 2000) (Figure 1). Engeström and his team have pursued an approach that models activity systems as the prime units of analysis while emphasising the object-oriented and contradiction-driven character of human activity (Engeström & Sannino, 2010).

Engeström's (1999) latest version of the Activity Theory (referred to as the third generation of Activity Theory), supports a view that two interacting activity systems form the minimal unit of analysis because human activities have a shared or constructed object (this is used later in Figure 2 with activities from the case study example).

Karanasios (2018, p. 135) states as one of the aims *"...to set an agenda for its advancement in IS, to ruminate upon future research concerning the extension of activity theory in IS, and develop a 'fourth-generation' activity theory."*

2.3 | Principles of Activity Theory

Engeström (2001) identifies five key principles which form the foundations of Activity Theory.

- The main unit of analysis in Activity Theory is the activity system.

FIGURE 1 The structure of a human activity system (Adapted from Engeström, 1987)

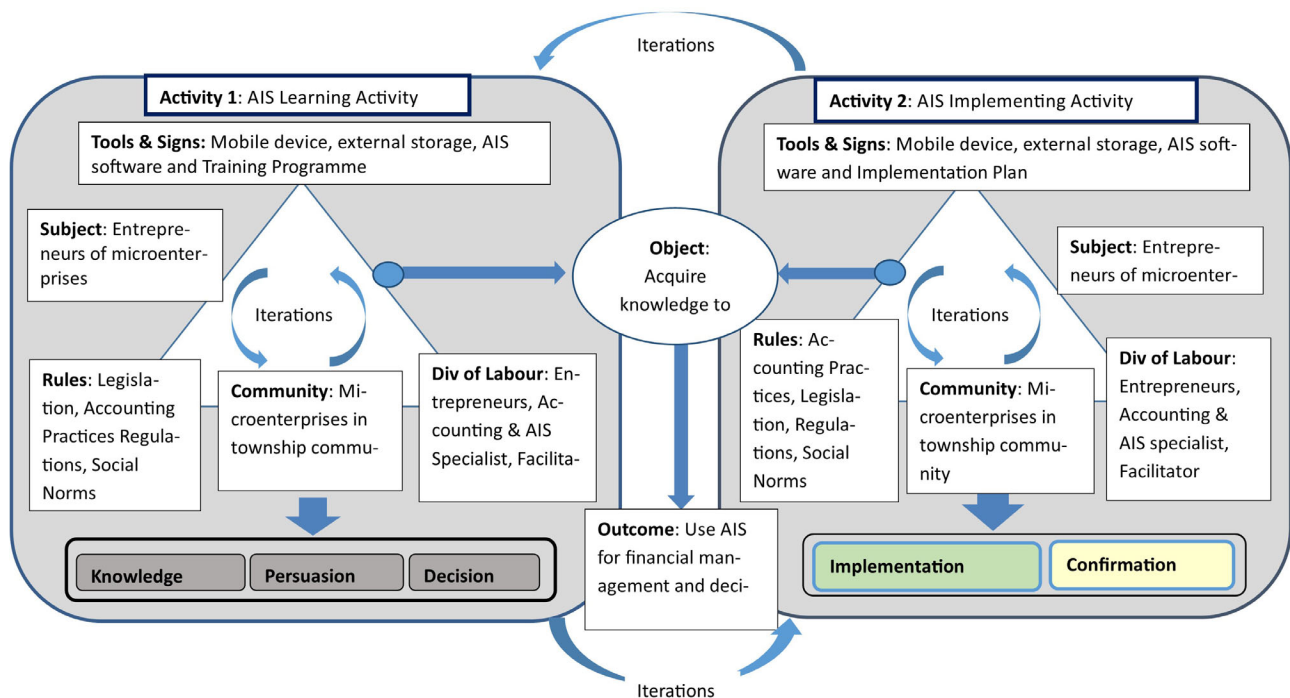
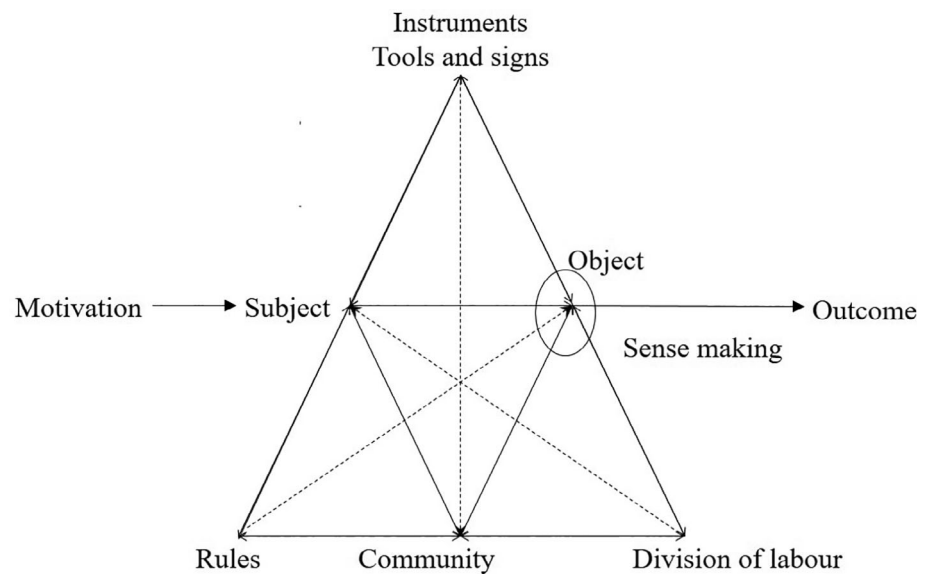


FIGURE 2 Analysis of the two activity systems (Learning and implementation)

- “Multi-voicedness”: the need to acknowledge the existence of multiple perspectives, interests and traditions in the study. These can be a source of trouble and of transformation, as members of an activity system have diverse histories and the system itself has multiple layers; its artefacts, rules and conventions are inevitably shaped by history.
- Historicity: awareness of the history of a set of activity systems helps researchers and participants understand the problems as well as the potentials.
- Contradictions: these can result in tensions but also trigger transformation in activity systems.
- Expansive learning: wide ranging transformations in activity systems may result from the re-conceptualisation of both the object and the motive of activity. Thus a radically wider set of new possibilities may evolve.

2.4 | Contradictions in activity systems

This paper pays particular attention to principle 4, that is, contradictions. The principle of contradictions is considered to introduce a foundational philosophical concept of Activity Theory. Contradictions are not merely conflicts or problems but are historically accumulating structural tensions within and between activity systems (Engeström, 2001). Activity systems constantly work to resolve contradictions but may also unintentionally create new contradictions; hence, they are “virtual disturbance- and innovation- producing machines.” In activity systems equilibrium is an exception and tensions, disturbances and local innovations are the rule and create the engine of change (Cole & Engeström, 1993).

Karanasios, Riisla, and Simeonova (2017) found that, although the principle of contradictions is one of the most frequently employed concepts of Activity Theory, it lacks a clear definition. Engeström and Sannino (2011, p. 368) made a similar point and commented that “*there is a risk that contradictions becomes another fashionable catchword with little theoretical content and analytical power.*” Many of the terms used (eg, “paradox,” “tensions,” “inconsistencies,” “conflict” or “dilemma”) reflect the same concept (Sannino & Engeström, 2018). Possibly as a result of this, although the concept of contradictions is fundamental in Activity Theory it is often used in a simplistic way (Karanasios, 2018; Simeonova, 2018). In order to address this, it is important to recognise that the causes of a contradiction generally have their roots in the past (historicity) and should, therefore, be traced over time and back to their historical origins (Sannino & Engeström, 2018). However, this may not be easy to do since “*contradictions are historically emergent and systemic phenomena, empirical studies have no direct access to them*” (Sannino & Engeström, 2018, p. 49).

In addition, it is often difficult to uncover contradictions, as established norms and existing power structures often resist change and hence deny or conceal evidence that change is required. This is countered by using various sources of data (multi-voicedness), various data collection methods (although qualitative data remains predominant the common sources of data used in case studies are needed), and longitudinal studies in Activity Theory research (Malaurent & Avison, 2016; Marcandella & Guèye, 2018; Weeger & Haase, 2016).

However, researchers utilising Activity Theory generally agree that Engeström's (1987) notion of contradiction-driven expansive learning cycles catalyzing the development of activity systems over time is a major aspect of the third generation of Activity Theory (Foot & Groleau, 2011).

2.5 | Types of contradictions

Sannino and Engeström (2018) identify four levels of contradictions within and between activity systems. Primary contradictions can exist within a node of the activity (eg, within the division of labour (Figure 1) where a particular task might be assigned to two different groups who have conflicting views about priorities). The secondary level involves contradictions that clearly involve two or more nodes within the activity (eg, between tools and rules as may occur if the ICT tool provides inadequate privacy or security to the subject and is contrary to organizational rules or national laws). Tertiary contradictions may arise exist between a newly established version of the activity (how things are done now) and remnants of the previous version. This often occurs when a radical change is made such as the introduction of an entirely new information system (such as an AIS in the case of microenterprises) where the tendency is naturally to go back to the more familiar old way of doing things. The most advanced level refers to the third generation of Activity Theory Engeström, 1999) where the two interacting activity systems are in conflict (see Figure 2).

2.6 | Critique of IS research using Activity Theory

Activities can be analysed at three levels, namely, activity, action and operation. The division helps the researcher in shifting the focus from the greater activity to finer grained actions and operations or sub-tasks. Karanasios and Allen (2018, p. 439) argue that Activity Theory has the ability to “address the challenge of studying the interaction between technology and actors”. However, these same authors note that few IS studies go to this more detailed level.

It is, therefore, not sufficient simply to identify contradictions; the research needs to identify and carry out actions to address these contradictions (Karanasios, 2018). Activity Theory is a practice-based theory (Karanasios & Allen, 2018; Simeonova, 2018) and research is often undertaken in the natural (work) setting as a longitudinal case study (eg, Malaurent & Avison, 2016; Marcandella & Guèye, 2018; Weeger & Haase, 2016). Hence, research using Activity Theory may embrace a participatory action research (PAR) model or canonical action research (Malaurent & Avison, 2016) with the iterative design that is required by PAR or may use a Design Science research methodology (see Kang & Hovav, 2018).

2.7 | Contradictions and congruencies

Instead of focusing only on contradictions, this paper introduces the concept of “strengths” within and between activity systems. The paper proposes that researchers should evaluate or assess the strength of the bonds that exist between the nodes within the activity system as well as

between interacting activity systems. Similarly, Allen, Brown, Karanasios, and Norman (2013) introduced a concept of “congruencies” in activity systems. They define “congruencies” as internal forces of balance within activity systems which foster reproduction rather change. Allen et al. (2013) cite Archer (1995) in their discussion of forces of change (morphogenesis) and forces of stability (morphostasis) in a system to explain contradictions and congruencies in activity systems.

2.8 | Facilitated adoption in ICT for development

Proposed models and approaches that could guide the implementation of ICT in the particular social context of the study (township microenterprises) were not easily found. Even when the paper referred to implementation of AIS in small and medium enterprises the conceptual implementation cycle was proposed for small businesses (eg, Lipi, Rama, & Agaraj, 2015) was considered too complex for the township microenterprises. Wolcott, Kamal, and Qureshi (2008) asserted that while ICT requirements were similar in many microenterprises, each business has its particular nature and issues, which have to be understood before a solution could be implemented. They further stated that successful implementation in microenterprises, not only depended on the quality of the technological solution, but also on the enthusiasm of the participants and the establishment of trust and communication with them. The trust and communication aspects of implementation that Wolcott et al. (2008) raise, speak to the soft issues related to the implementation activity.

2.9 | Implementation and usage of AIS in small businesses

There are many factors that result in resistance to the introduction of AIS. External consultants play a significant role in terms of expertise and support in the successful implementation of AIS software even though at times they have been criticised for not understanding the requirements of small businesses (Pulakanam & Suraweera, 2010). However, uncertainty about the impact of the technology can be a problem; thus, the implementer may need assistance from change agents (Rogers, 2003). Although microenterprises know that they require help to implement AIS, they are concerned about the cost of qualified professionals (Kahsay, 2019). In addition, Seeletse (2012) found that entrepreneurs in the township often distrust consultants or specialists and think that paying for their services is a waste of money. Another challenge is reducing longer term dependency on mentors, and the need for an exit strategy is well known (see for example Marais & Meyer, 2015).

On the other hand, owner-managers of small businesses that are involved in the implementation of the AIS achieve a user-satisfaction which can lead to system acceptance and ultimately, successful business efforts (Riemenschneider & Mykytyn Jr, 2000).

3 | THE RESEARCH METHODOLOGY

3.1 | Choice of methodology

A study was conducted involving a small group of participant microenterprises in the township of Alexandra. This is presented as a single case as these microenterprises were not compared and the activity systems of learning and implementation were considered to be largely the same for all three participants. The knowledge obtained was useful in understanding human activities in the facilitated adoption of AIS within their setting. As the case study methodology is versatile, it is compatible with any philosophical perspective (Dube & Pare, 2010). The case study is one of the most popular research strategies or methodologies utilised by critical realists and interpretivists in IS (Wynn & Williams, 2012).

PAR was used in the development stages of this research, as recommended by Malaurent and Avison (2016). This was also considered to be a single case study; these two methodologies were considered to be aligned with the principles and objectives the study. PAR recognises that people have a right to play a meaningful role in choosing their own development goals and acknowledges that this can best be achieved if people participate by analysing their local challenges and propose appropriate solutions (Attwood, 1997). Hence, they have some degree of power and control over the decision making, planning, design and implementation of these solutions. This increases the probability of achieving sustainable development.

The data was gathered from interviews and observations. The data was coded according to the elements or nodes within the activity systems. The data was then analysed using a comparison matrix by comparing the coded data at different nodes as explained in the next section.

3.2 | The entrepreneurs and microenterprises

The researcher purposively selected participants for this study as is frequently done in case studies. According to Palys (2008), researchers use the purposive approach if they want to make strategic choices about whom, where and how the study is conducted in relation to the objectives.

Three microenterprises were selected and these were represented by their three owner-managers. The researcher chose participants (ie, the "human subjects"), who were knowledgeable about the social system of the community, committed to the research and could benefit from the study. The cultural and historical context of the case study are relevant to this research particularly as Activity Theory pays explicit attention to these aspects. Prior to 1994, during the apartheid era, Alexandra township was reserved for "black" or African residents only and it has largely remained impoverished, with poor infrastructure, is over crowded and has many street vendors and a largely informal economy. Unlike the other townships, Alexandra is surrounded by wealthier neighbourhoods (so-called "leafy suburbs") whose residents and business owners were previously white. However, now there are no restrictions regarding where people live and the wealthier suburbs have residents from all components of the population.

Microenterprise A was operated from Entrepreneur A's house in Alexandra township. It was established to take advantage of the construction and maintenance opportunities that were being offered by government (local entrepreneurs were given preference to work on projects in their communities). Its core business at the time of the study was grass cutting and paving. It employed only casual workers and the number depended on the current work load (this was about 15 grass cutters at the time). For Microenterprise A to be considered by the government for opportunities, it had to be a registered entity and have a bank account, tax clearance, a BEE certificate, and proof that it was located in the community of Alexandra. However, Microenterprise A also did work outside Alexandra when opportunities arose.

The other two microenterprises in the study did not do business with the government; therefore, they did not need to comply with requirements that Microenterprise A had to.

In 2014 entrepreneur B identified an opportunity in offering township-based microenterprises an Internet presence and developed simple websites. Microenterprise B offered very affordable pricing, understood the needs of his clients and made it simple and feasible for them to advertise their businesses on the Internet. The websites that Microenterprise B built did not have transactional or e-commerce capabilities; they only provided information about the clients' enterprises. Microenterprise B had taken advantage of the technology opportunities presented by developments in Open Source software and the Internet (rapid deployment and easy-to-use software development tools). Microenterprise B charged a monthly fee for the services it provided. Its clients included locally based microenterprises, NGOs and schools. It had a part-time staff complement of four people. At the time of the study, Microenterprise B was participating in an Enterprise Development Programme (EDP) offered by The Innovation Hub, an agency of government that supported small business development.

In 2013 Entrepreneur C and a friend launched a company which erects billboards, organises events (including a Christmas party for underprivileged children which was sponsored by the Oprah Winfrey and Nelson Mandela Foundations) and provides marketing services to reach the township community. At the time of the study, Microenterprise C was participating in an EDP offered by The Innovation Hub, an agency of government that supports small business development.

4 | RESEARCH FINDINGS

4.1 | The action research timeline

The facilitated adoption process consisted of four key activities each of which could have been studied in detail. However, in this study, the researcher concentrated on the learning and implementation activities because they play critical role in the early stages when introducing technology or innovation into social system.

Phase 0: Pre-Formal Activity (How the microenterprises managed their business and finances before AIS).

For each of the microenterprises, information was obtained during one-on-one interviews so that a personal profile of the entrepreneur could be written, an as-is synopsis of the business processes could be created and the financial management processes used before study could be described. A thorough SWOT Analysis was carried out for each enterprise.

Phase 1: Learning Activity (*Learning basic accounting and AIS*). As shown in Figure 2, the Learning Activity covered three of the five innovation-decision stages (Rogers, 2003), namely, knowledge, persuasion and decision (the identification of the detailed interventions in the separate teaching is beyond the scope of this paper). The training programme had two parts: part one covered the basic accounting principles and part two, the AIS software training (how to setup and use the AIS software) as the entrepreneurs could not be expected to learn how to use an AIS software without understanding basic accounting principles. Two iterations of the training programme were conducted by the accounting specialist over a period of 2 months. Classes occurred every week in that period on Saturdays from 09h00 to 13h00. The second set of classes (the second iteration) occurred in the second month and revisited tasks that the participants identified as still being difficult to complete independently. During the first iteration, the researcher gathered data about the entrepreneurs' understanding of the accounting principles and the AIS through individual and focus group interviews. As the training progressed, further data was gathered regarding entrepreneurs' perspectives.

Phase 2: Implementation Activity (*Implementing AIS in the microenterprises*). The Implementation Activity made-up the fourth stage of the Rogers innovation-decision stages (2003). It took place a week after the learning activity ended. The planning session with the participants resulted in the following 4-step implementation plan: information preparation, installation and setup, financial data capturing and AIS usage.

After the installation, setup and capture, the AIS was ready for new transactions. The entrepreneur could start using it for business transactions from there on. The researcher and the accounting specialist monitored the usage and provided support for a period of 4 weeks after implementation. The monitoring and support to the entrepreneurs included the following:

- Checking their AIS weekly to see if they were entering transactions correctly.
- Checking weekly they that they were backing up the financial data according to schedule
- Assisting them with capturing transactions that were outstanding
- Assisting them in analysing and interpreting reports
- Telephonic assistance for any accounting queries

The accounting specialist was on standby to provide telephonic support to the entrepreneurs; the entrepreneurs could call her and request help for any accounting matter during business hours. The researcher was also on standby, in case the entrepreneurs experienced technical problems with their mobile device or the AIS software.

Phase 3: Sustained Usage AIS Activity (Looking into the continued use of AIS). The confirmation stage largely fell outside the scope of the study; the study did not persist to confirm whether there was sustained use of AIS in the long-term.

The researcher decided to conduct a fourth round interview 18 months after the implementation of AIS. It was a focus group interview and it was meant to reflect on the study as whole and clarify certain aspects of the data that was previously gathered.

4.2 | The learning activity and implementation activity

The learning activity and the implementation activity were at the centre of the action research as these were where most of the interventions and active research cycles occurred (see Figure 2). The two activities were analysed using Engeström's (1987) expanded model of the Activity System. An individual's decision to adopt an innovation is not a bounded event or a single act, it occurs over a period time (Rogers, 2003).

The implementation activity took place a week after the learning activity ended. This activity was equally critical to the facilitated adoption of AIS, that is, if the implementation went wrong or failed, it would have had a serious, adverse effect on the entire adoption process. The implementation plan consisted of information preparation, installation and setup, financial data capture, AIS Usage. Even though these four steps seemed fairly obvious and straightforward, they were necessary to guide the implementation of the AIS. The implementation plan was customised for the context of the study. The plan was simple because (a) the implementation of AIS was to be done by the entrepreneurs themselves, (b) the AIS application was very simple and did not require a complicated implementation plan. Hence, the implementation developed in this study was much simpler than the conceptual implementation cycle that Lipi et al. (2015) proposed for small businesses. Township entrepreneurs were at the beginning of the AIS adoption journey; therefore, they needed an entry-level or rudimentary AIS solution and implementation plan. Though the steps in the implementation plan appeared to be straightforward, there were challenges in two of the steps in particular, Step 2 (installation and setup) and Step 3 (financial data capture).

4.3 | Identifying and resolving contradictions

Two human activities (learning and implementation) were analysed in detail. The participants in the study included the researcher, the entrepreneurs and the accounting specialist and together they identified the contradictions and attempting to resolve as many of these as possible during of the study. There was a comparison matrix for each of the activity systems and a third one to analyze the relationships between the two systems. However, in order to demonstrate the relationship between contradictions and strengths, this paper will concentrate only on the implementation activity. The comparison matrix enabled the coded data to be analysed (compared) with each other node or element of the activity system in order to identify contradictions. The first five contradictions follow Table 1 as examples but there are 15 distinct pairs of elements that need to be examined in a single activity. Please note that the case study is being used in this paper only to illustrate the point being made regarding the value of both contradictions *and* the strength of relationships between different elements. Hence only a selected number of contradictions are discussed in detail.

Some of the contradictions could not be resolved in the duration of the study. It was expected that the township entrepreneurs would continue with the effort of resolving the outstanding contradictions beyond the study. With time, they would become more proficient in the use of the AIS and gain more accounting knowledge hence they would be able to resolve the more complicated contradictions.

- Contradiction between Subject and Tools and Sign

Even after learning about, and practicing the AIS, the entrepreneurs needed help to create the chart of accounts and to capture transactions correctly.

TABLE 1 Comparison matrix of the AIS implementation activity

	Subject	Tools and signs	Object	Division of labour	Community	Rules
Who or what	Three entrepreneurs of Micro-enterprises	Mobile device, external storage, AIS software and implementation plan	Implement-ing and using AIS	Roles in the implementation activity	Research participants	Legislation, regulations, practices and norms
Subject	1.	2.	3.	4.	5a.	5b.
Tools & Signs	6.	7.	8.	9.		
Object		10.	11.	12.		
Division of Labour			13.	14.		
Community					15.	
Rules						

Resolution. The accounting specialist guided entrepreneurs through the process of setting up the chart of accounts. She also helped the entrepreneurs capture transactions correctly.

- Contradiction between Subject and Object

Entrepreneurs were not always capturing transactions in the AIS as they occurred and they also did not stick to the backup schedule. They would forget to capture some transactions. The old habits were difficult to overcome.

Resolution. The researcher and accounting specialist re-enforced the message that entrepreneurs needed to have the discipline and commitment to capture transactions and back up data according to the schedule. It did, however, seem that the AIS would become fully institutionalized over time.

- Contradiction between Subject and Division of labour

Entrepreneurs needed to consult the accounting specialist regularly for help on capturing transactions correctly.

Resolution. The entrepreneurs were given the accounting specialist's contact number. They could call the accounting specialist for help any-time until the study came to a conclusion.

- Contradiction between Subject and Community

The online technical support needed to be tried and tested by the entrepreneurs.

No resolution.

- Contradiction between Subject and Rules
- The entrepreneurs were not completely comfortable with revealing their financial data. They were not completely transparent to the accounting specialist and facilitator.

Resolution: The facilitator and accounting specialist had to encourage the entrepreneur to be more transparent with their financial data since there was an ethical (non-disclosure) undertaking to keep their information private in the research.

- The entrepreneurs continued some informal practices like borrowing money from Mashonis (informal money-lenders).

Resolution: There was no resolution to this informal practice because the entrepreneurs could not get credit from banks.

4.4 | Observation of the AIS implementation activity

During the Implementation Activity, the researcher observed that the entrepreneurs were skilled in using the mobile devices (tablets) because of their experience with smartphones (**first observation**). Hence, they were able to install the AIS software very quickly. However, (**second observation**) when it was time to implement the system (select options and populate the accounting system with initial data), they needed help from the accounting specialist. In other words, although at this stage they understood the accounting concepts, they could not apply them. This was despite two rounds of practical training on how to use the AIS. The researcher perceived this as a contradiction between learning and applying concepts in the real world. It meant that support during implementation was necessary - the continued guidance and support of specialists was needed.

The third observation was that, after the AIS was installed and set up, the entrepreneurs were able to use it without much assistance.

Fourth observation. The entrepreneurs had to be constantly reminded to back up their data. This is a very important aspect of managing an AIS.

Fifth observation. When the entrepreneurs began capturing new financial data in their businesses, they consulted the accounting specialist a lot more frequently to find out how to treat certain transactions. The accounting specialist has taught the entrepreneurs only basic accounting concepts. In the real world, depending on the type of business activities, certain transactions would have to be treated differently. If they came across a transaction that they were not sure about, they would need assistance from a specialist.

Sixth observation. The AIS software selected was very simple and stable. The entrepreneurs did not contact the AIS specialist for any technical support during the study. As the AIS software was open source, they were given the website address where they could request assistance if they had technical problems.

Seventh observation. The entrepreneurs requested the contact details of the accounting specialist for future support. The entrepreneurs were prepared to pay for accounting support services, which was a change in attitude from the beginning of the study. They implied that they would also be prepared to pay for AIS software if they thought could add value to their business. At the beginning of the study, the entrepreneurs stated that they only used pirated software - they would not pay for software. This is evidence of a change in attitude even though initially the initial reluctance to pay for services and software was because it was considered to be unaffordable and was not at that time identified as a contradiction between norms and the intention to run the enterprise more efficiently.

Eighth observation. Although the activity system framework played a pivotal role in the analysis of the two human activities and identification of contradictions, the researcher noticed an incongruity. The use of the framework encouraged the participants and the researcher to focus on identifying and resolving contradictions but it did not encourage the researcher and participants to deliberate on or identify strengths within and between the elements in the activity systems. The researcher was of the view that identifying strengths could contribute to the overall understanding of the human activities.

The contradictions were in the form of tensions, issues or other problems encountered while carrying out the AIS implementation activity. However the activity systems were not analysed to determine the strengths between them or the nodes within them.

4.5 | Recognition of strengths in activity systems

In response to the eighth observation, the researcher analysed the implementation activity and identified the strengths between its nodes. Table 2 captures the strengths identified in the implementation activity. The researcher attempted to explain the implication (value) of each of the strengths identified to the human activity under examination.

5 | DISCUSSION OF FINDINGS

Wolcott et al. (2008) highlighted the need to customise an implementation plan for the environment and particularly for the business and this advice was applied in this study. The information preparation step in the implementation plan was used to gather specific information for each microenterprise.

The trust and communication aspects of implementation that Wolcott et al. (2008) raise, speak to the soft issues related to the implementation activity. The findings of this research showed that entrepreneurs developed a trust relationship with the accounting specialist as well as the facilitator.

Rogers' (2003) stated that the implementers are likely to need technical assistance and support from change agents. However, in this study which used simple software and familiar devices little technical support was needed. This indicates the extent to which the spread of mobile devices with apps has made simple business applications usable to very small businesses in low-income environments.

TABLE 2 Strengths and implications in the AIS implementation activity system

	Strength identified	Implication
Subject – Tools	The entrepreneurs were already familiar and had fully adopted mobile devices and mobile applications before the study.	This made the AIS implementation faster and easier. It shortened the learning curve.
Subject – Object	The entrepreneurs were educated, computer literate, had business experience and eager to implement AIS.	The entrepreneur made a contribution to the AIS implementation Activity through their local knowledge and business experience.
Subject – Division of labour	a) The entrepreneurs themselves played a significant role in the AIS implementation activity. b) The accounting specialist had expertise in accounting, small businesses and AIS.	The entrepreneurs had perceived personal value in the project and influenced the AIS implementation activity. The combination of skills the accounting specialist brought to the project were an advantage to the implementation of AIS.
Subject – Community	The accounting specialist came from same community as the entrepreneurs (Alexandra township).	The entrepreneurs were able to identify with her. The accounting specialist knew the background of the entrepreneurs very well. The entrepreneurs are more likely to trust one of their own.
Subject – Rules	The entrepreneurs were well-versed in the norms and business practices in the community of Alexandra.	The entrepreneurs were aware of the culture of the community. This was taken into account in the AIS implementation.
Tools and Signs- Object	The choice of mobile AIS made it easy and affordable for entrepreneurs to access AIS at anytime from anywhere.	Mobile AIS made it convenient for the entrepreneurs to keep financial records themselves. This could improve their chances of adopting AIS.
Tools and Signs- Division of labour	The accounting and AIS specialist and the ICT specialist (facilitator) were able to provide support for the mediating tools.	The availability of specialists to provide support in the implementation activity inculcated trust and confidence in the AIS.
Tools and Signs- Community	The high penetration rate of mobile technology means most township microenterprises have access to smartphones (ICT)	This makes it conducive for the adoption of mobile AIS amongst township microenterprises.
Tools and Signs- Rules	The mobile AIS complies with regulatory and statutory requirements. Mobile technology has also been well-received in the township communities. It does not seem to go against the norms of the community.	The Mobile AIS complies with regulatory requirements for example, Value Added Tax (VAT) It has a functionality to calculate VAT. Microenterprises can determine their VAT obligations which improves their chances of complying.
Object - Division of labour	The tasks were shared amongst the four participants; the entrepreneurs, accounting AIS specialist and facilitator (ICT specialist).	Sharing of tasks allowed each participant to contribute to the AIS implementation activity. This enabled the sharing of knowledge, a sense of ownership and responsibility.
Object - Community	No strength identified.	This is actually a contradiction because small businesses in the township have not embraced AIS for growth and sustainability.
Object - Rules	Implementing AIS could improve compliance of microenterprise to regulations and laws.	AIS will enable the entrepreneurs to keep financial records. The financial records could be used to determine the extent of their financial obligation to the authorities.
Division of Labour - Community	No strength identified.	This is contradiction because there is a lack expertise or professionals to assist small businesses in the township.
Division of Labour - Rules	The accounting specialist had knowledge of the accounting regulations and practices. The ICT specialist had knowledge of ICT regulations and practices. The entrepreneurs had knowledge on the norms and business practices in the community.	Each participant shared their knowledge of regulations, laws and norms that impacted on the AIS implementation activity.
Community - Division of Labour	No strength identified	Small business in the township community mostly ignore regulations and proper business practices.

It was found that the entrepreneurs were prepared to pay for the accounting specialist to continue providing them with support after the conclusion of the study as they recognised the value of having access to external expertise in the usage and development of their microenterprises. Follow-up interviews demonstrated that indeed the entrepreneurs had in fact carried out this intention. External support to the

entrepreneurs was an integral part of the facilitated adoption of AIS. This is a change of attitude from that considered the norm in small businesses in townships in South Africa (Seeletse, 2012).

The continuing relationships, such as those between the subject and object; the owner-managers of the microenterprises saw value in the object and outcome, hence they were motivated to join the project and remained committed to achieving the outcome even when contradictions, which were perceived as barriers or challenges, became apparent were predictors of sustained use of the AIS. Possibly the most important and continuing relationship was between the subjects and the accounting expert. The fact that this person was prepared to continue advising and supporting the entrepreneurs from the start of the project to the phase of continued use was a major factor and clearly illustrates the value of continuity in support relationships.

The view of the entrepreneurs was captured in the following comments by Entrepreneur B:

Entrepreneur B said “the accounting specialist is so knowledgeable, patient, and supportive and she understands our needs as township entrepreneurs because she is from Alexandra. She has really changed our mind-set about accounting and AIS.”

The challenge of reducing dependency on mentors, and for an exit strategy was mentioned in Section 2 (Literature Review). It was evident from this research that the businesses did not feel ready to end their relationship with the accounting expert but were prepared to allow the relationship to evolve into that of a paid consultant.

Additional important and continuing relationships were evident between the subjects and the community as well as between those taking roles in the division of labour and the community. A deep understanding of the context including cultural and historical influences by all of the role players was found to have been an important success factor. These stakeholders were the researcher who facilitated and was an active advocate of AIS, the accounting expert and teacher, both of who featured in the division of labour, and the subjects themselves. A third set of continued strong relationships was between the individuals in the group of subjects who were all present during the learning activity and had common interests.

However, as is repeatedly pointed out in the literature on Activity Theory, contradictions which result in establishing new relationships or in reformulating relationships, are important for innovation. Therefore, although a strong and stable relationship between the subject and rules and norms in an activity system can also be expected to assist in stabilising and activity system, in this case, before this happened (ie, during the implementation phase but prior to the phase of sustained use) it was necessary for the existing norms relating to guarding financial information and not participating in the national financial regimen (particularly regarding taxes) be changed. Thus an important part of the research and justifies the use of Activity Theory.

The researcher attempted to demonstrate the value of identifying strengths in activity systems by analysing the AIS implementation activity. The research participants identified the strengths between the elements of the AIS implementation activity. The strengths identified were captured in a comparison matrix (Columns 1 and 2 of Table 2). After identifying the strengths in the implementation activity system, the researcher went ahead and explained the implication (value) of each of the strengths in Column 3 of Table 2. The implications (value) of the strengths seemed to provide information that could potentially be valuable in determining the viability of the human activity in achieving its object. The strengths show where the stronger the bonds exist between the elements in the activity system, the more likely the activity could achieve its object.

Together the contradictions and strengths showed the two sides of the human activity under examination; simply put “the strengths and weaknesses” of the activity. The participants could therefore capitalise on the strengths in the activity system and attempt to fix the weaknesses (contradictions) in order to achieve the object of the human activity.

6 | CONCLUSION

Although this research has as a tangible objective to demonstrate to the owner-manager the value of AIS use within the microenterprise by facilitating its adoption, it recognises that each organization, in this case, microenterprise is complex and unique and that the outcomes cannot be controlled in any sense. This is based on the view that Activity Theory is explanatory rather than a predictive. Hence, the researcher made no assumptions regarding whether the three microenterprises have the same adoption trajectory.

The findings show that capturing both contradictions and strengths of activity systems could increase the insight into the human activity under examination. Awareness of the influence of these strong relationships and positive influences within and between activity systems could assist researchers in predicting the viability of the human activity in realising its object and ultimately the desired outcome. The stronger the connections, the more likely the human activity is to attain its objective and expected outcome. The inclusion of strengths in the analysis of activity systems is a feature that could potentially be utilised by Activity Theorists where there is a need to assess the viability of the activity under

examination. Though the paper emphasises a theoretical contribution, the study itself had a practical contribution based on the use of Activity Theory as a Participatory Action Research (PAR) to empower the subjects (entrepreneurs) within the community. The study supported Sannino and Engeström's (2018) assertion that the transformative and participatory nature of Activity Theory can improve the lives of the research participants and push forward the cultural-historical understanding of human functioning. The researcher is of the view that knowledge of strengths within the activity systems could be helpful in predicting and influencing the outcome of the human activity in IS adoption. (Engeström, 2001). Even though this paper is limited to a discussion of the contradictions and strengths within and between the elements of an activity and between activities, the other four principles stated in the literature review by Engeström (2001) were also addressed in the study. The other principles could be examined in more detail in future papers.

It is evident, therefore, that many of the strengths identified in this research had been identified as critical success factors in other research relating to small businesses. Hence, this paper is not claiming that these results are unexpected. It is, however, using this to emphasise that, in research which makes use of Activity Theory for facilitated adoption, these critical success factors must be present as strong relationships between the pairs of elements in the activity systems.

It is important also to recognise that this project differed from many other studies using Activity Theory in IS research which pay particular attention to the developing business activities in an organization. In such conventional adoption studies it would be important to study the differences between the business activity system in place prior to the introduction of the new information system and the business system envisaged or in place after the implementation of the new information system. In this study, an acknowledged bias is to introduce the new system based on reports that formal accounting systems strengthen microenterprises. Hence, the emphasis is on aligning the facilitated learning and implementation activities. In addition, the adoption and use studies most frequently refer to medium, large or even multinational organizations. In this study, however, the organizations concerned are microenterprises. Hence, the study resonates with the use of Activity Theory in Education and indeed with the origins of Activity Theory.

As noted earlier, the importance and role of contradictions in the human activity has been acknowledged by modern activity theorists (Foot & Groleau, 2011). Some of the contradictions that were identified in the AIS implementation activity were described in Section 4 (the Research Findings). The participants attempted to resolve the contradictions identified. Identifying and resolving contradictions was shown to improve the chances of AIS adoption by the microenterprises (achieving the objective). It could also be expected to have a significant impact on the way these combined activities with a shared outcome would be carried out in township microenterprises in future (it would transform the activity). This finding supports the notion that contradictions are the driving force of change and development in human activity.

The concept of "strengths" introduced in this paper is similar to the "congruencies" referred to by Allen et al. (2013). The concept of "congruencies" refers to the forces that stabilize activity systems in contrast with "contradictions" as the forces that cause change in activity systems. The "strengths" in this paper have a slightly different (but compatible) implication as they refer to the strengths of the bonds or compatibility between nodes within and between the activity systems which are predicted to contribute to the viability of achieving the desired future object and outcome of the activities. The approach to the activities in the study was facilitated or interventionist with the deliberate intention of improving the chances of achieving the desired object. The researcher recognised and purposefully capitalised on the strengths within the activity systems as he recognised early in the project that existing strengths made to project feasible and he also capitalised on those relationships throughout the implementation in order to improve the chances of long term AIS use. Hence, this paper is not only about the theoretical contribution but also about the rigour/methodological aspects. This is compatible with the theoretical contribution as the paper looks at contradictions and strengths and methodology and a few illustrative examples were needed.

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ENDNOTE

¹The motivation for this full study was to find ways to stimulate the growth and sustainability of township microenterprises, and was based on the view from the literature that that introducing mobile AIS assists in this process. As they grow, these enterprises are likely to employ additional staff. This could in turn have implications for government policy on the development of small businesses, tackling unemployment and poverty alleviation.

The main research question was: How should AIS be introduced into the chosen township microenterprises to accelerate its adoption?

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How to cite this article: Kamanga R, Alexander PM. Contradictions and strengths in activity systems: Enhancing insights into human activity in IS adoption research. *Electron j inf syst dev ctries*. 2020;e12149. <https://doi.org/10.1002/isd2.12149>